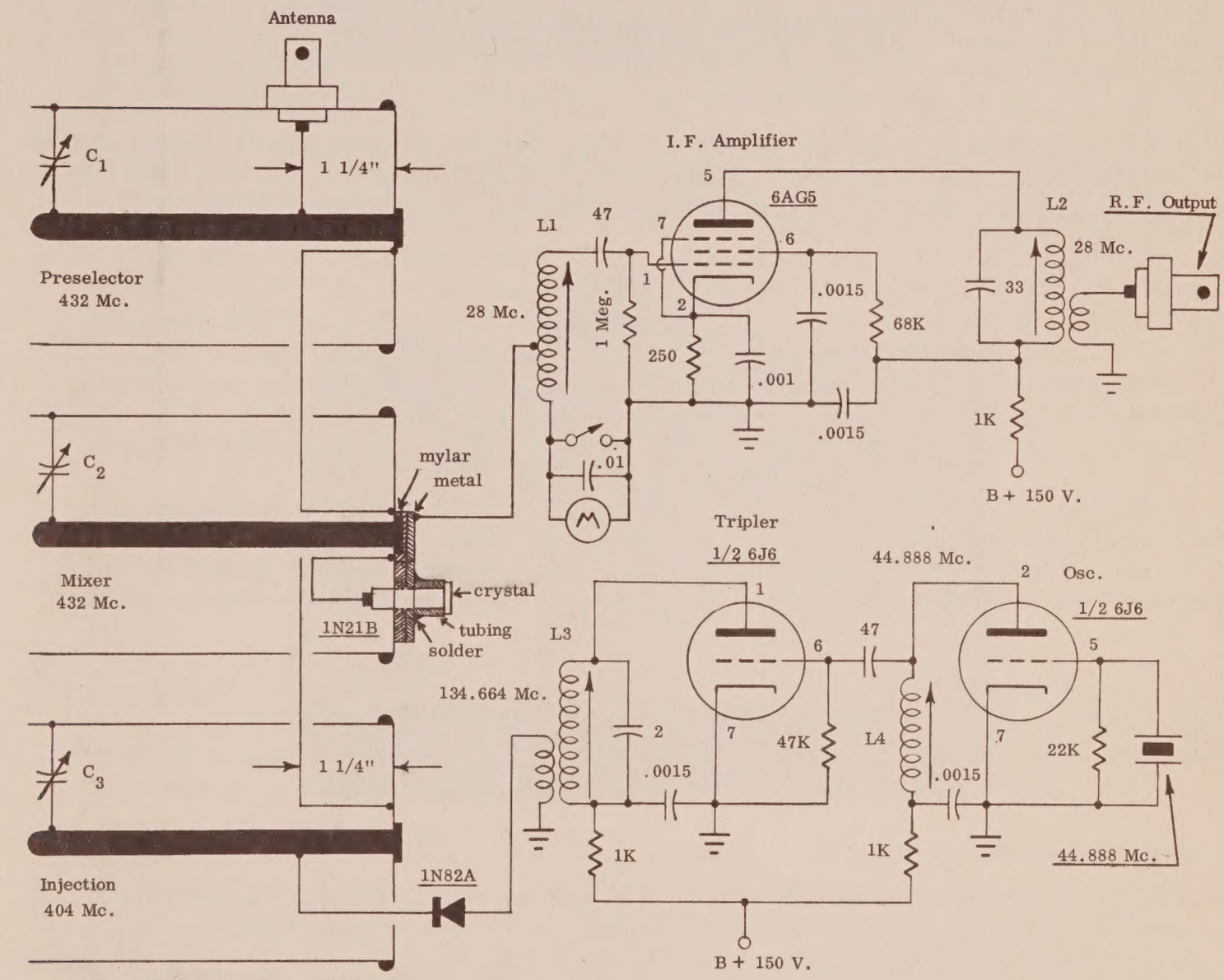
VHFER

50 MC. AND UP

LEARN BY DOING

Volume 3, No. 6 June 1965



All tin cans 3 7/8" long, 2 1/8" in diameter.

Center conductor 3/16" diameter

Coil data for 432 Mc. Tin Can Converter

L_1 28 Mc. 3/16" diameter, slug tuned. 25 turns #24 tapped 8 turns from cold end.

L_2 28 Mc. 3/16" diameter, slug tuned. 14 turns # 20. Link 2 turns on cold end. #18 hook-up wire.

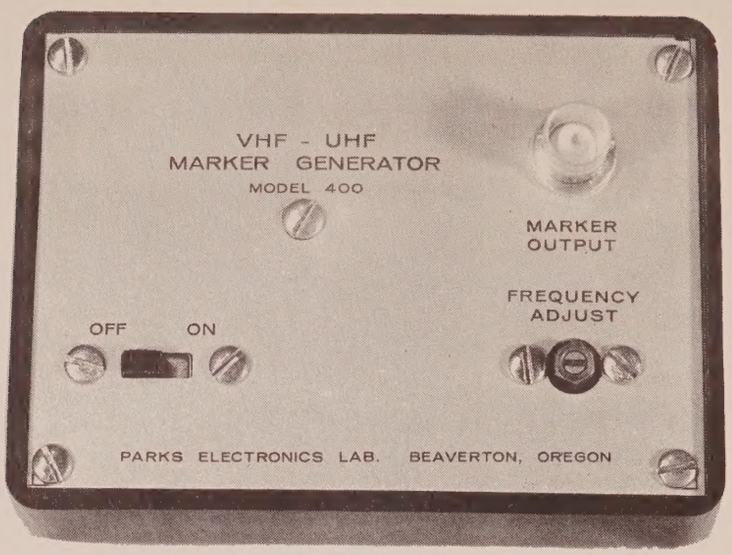
L_3 134.6 Mc. 3/16" diameter, slug tuned. 5 turns #18. Link 2 turns on cold end. #18 hook-up wire.

L_4 48.88 Mc. 3/16" diameter, slug tuned. 16 turns #22

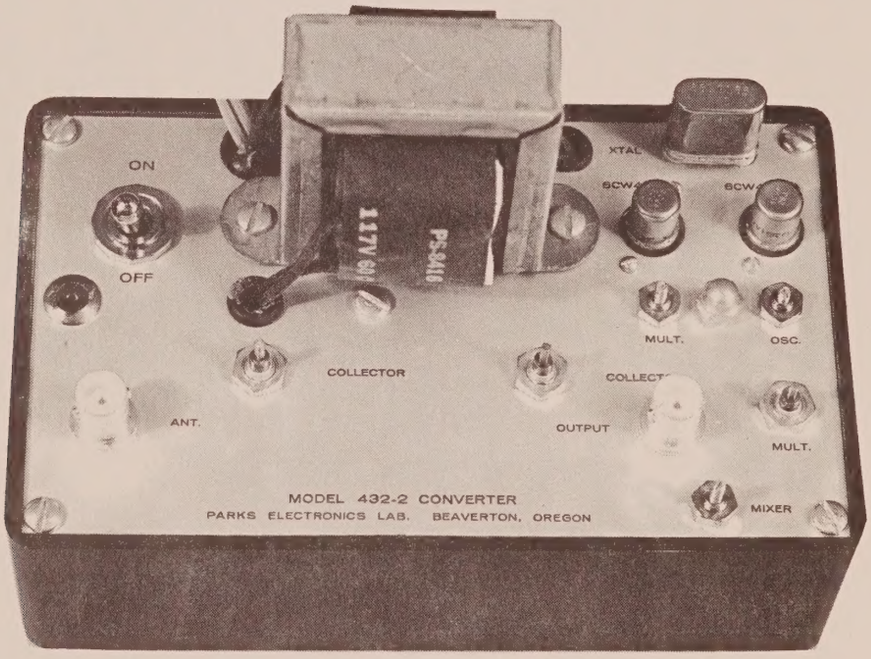
C_1-C_2-C_3 Piston capacitors. Approximately .5 to 10 mmf.

TIN CAN CONVERTER FOR 432

TWO NEW PRODUCTS



Here's the marker generator described in May, VHFER. We got requests from hams who wanted to buy it so we decided to make it. Price is $25, postpaid. Delivery after July 15. Gives markers every 1 Mc. thru and beyond 1296 Mc. Adjust against WWV.



This is a modification of our all nuvistor converter for 432. The noise figure is lower, the front end is more tolerant of antenna mismatch, and there is more gain to cover the noise of your receiver. Transistors (underneath) are two 2N3399s as r.f. amplifiers, and a 2N3478 mixer. The two nuvistors are used in a Butler-type oscillator. No internal batteries--all a.c. powered. Guaranteed to please. $54.95 postpaid. Those of you who have our Model 432-1, we can up-date it to make it exactly like the 432-2 including a new panel for $10, postage paid.

parks electronics laboratory route 2, box 35 beaverton, oregon

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ODDS & ENDS
K7AAD

The big event for UHF comes off July 3rd and July 24th when KP4BPZ at Arecibo, Puerto Rico will be using the thousand foot hemishperical reflector of the Cornell Univ. Ionospheric Laboratory. On July 3 the test will start with a 2-minute c.w. CQ by KP4BPZ at 1942 GMT, on 432.000 Mc. That's 1242 PDT same date. They prefer that stations calling use 432.01 to 432.1. After initial c.w. contacts, KP4BPZ will shift to lower sideband S.S.B. and attempt 2-way voice work. It is anticipated that 100 watts output on s.s.b. and an antenna gain of 15 d.b. should permit voice work. The same procedure will be followed on July 24. To give everyone a chance it is suggested that contacts be kept as brief as possible. Please report observations to ARRL. The preceeding paraphrased from ARRL bulletin of May 26. Additional information has been scrounged, to wit--polarization will be circular, probably right-hand circular and at any rate probably the same as described in QST about the event last time. Any linear polarization can be used with a loss of 3 d.b. If you have an antenna that works, use it. The big dish gain is 56.25 d.b. at 432 and the path loss is 261 d.b. In trying to confirm a bit of the above I called Sam Harris' residence but found he has moved to Puerto Rico for at least a couple of years. He is on 75 and 20 meters.

Getting power out at 432 with reasonable efficiency apparently is a problem. A kilowatt amplifier described in QST not long ago measured about 20% efficiency. W7UDM's rig measured a little over 50% when fed into 2,000 feet of RG 8/U as a dummy load. His rig has half-wave lines inside a box about 1' square. At present he attributes the higher efficiency to the big box, however there is a question about the output coupling method in the QST final. We'll know the answers probably within a month or so and report. W7UDMs final will be described in VHFER later. The need is for a decent exciter for 432. Several hams at Tektronix are going to pool their efforts to come up with a 432 exciter with reasonable power that isn't hard to build. The idea is to make several and if they all work, to publish a description.

The crying need is for a kit of metalwork for these big rigs and efforts are being put forth in that direction. I absolutely do not have the time to spend on that sort of thing and have to rely on others. K7ZIR has made two very nice KW finals for 2 & is now working on a 4X150 tripler to 432 which we hope to describe and offer you the metalwork at a reasonable price.

Every Calif. VHF get-together in the past has had an informal converter competition for 2 meters. W6NGN brings his weak signal source which is adjustable in output by means of a micrometer-type dial. Several converters are tried and the one which hears the signal with the lowest dial setting wins. This device will be described in the next VHFER.

VHFER articles have been heavy on antennas recently. Keep in mind that antenna articles are no good in the dead of winter. Another reason for harping on antennas is to prepare you for the results of the antenna contest to be held at the ARRL National Convention July 3. It has been "arranged" to enter as many "store-bought" antennas as possible for 432. I'm taking the Gibson yagi I always take for comparisons and the Gain Skybeam for 432. There will also be a new Telrex and Hy-Gain entered which were purchased especially for the contest plus other ones we can scrounge. One big problem in entering commercial antennas is making darned sure the antennas are put together just as the manufacturer says. Also, models change. So to try to minimize any chance of mistake or being unfair and to benefit those of you who cannot attend the contest, K6KV in Santa Barbara and I are footing the bill on the 3 brand new 432 antennas. We've had Telrex, Cushcraft and Hy-Gain at previous contests and results were written up in VHFER last year. I have copies of the results you may have for a self-addressed, stamped envelope. The antennas that always win are the extended-expanded colinears described in the Frank Jones (CQ) Handbook.

Continued on page 12

ANTENNA MEASUREMENTS WITH A MATCHED DETECTOR

by Frederick W. Brown, W6HPH*

What with all the recent attention given to antenna contests, this summer should see a great many such competitions throughout the country. The day may even come when we have call-district-wide and nation-wide finals. Such large scale contests would probably do more to raise the level of the amateur antenna art than all the technical articles written so far.

For the individual participant the main value of the antenna contest lies in revealing just how low his antenna gain really is. The very sick performance of most store-bought antennas usually comes as a shocking surprise to those who take the advertisements literally.

The fine points of making gain measurements by what might be called the "receiver method" have been published in detail, [1, 2] and will not be repeated here. Of course, even a "guess" meter can be used to determine relative performance (which antenna is best, 2nd best, etc.). But for absolute gain figures in db. over a dipole, a signal strength meter with an accurately known response characteristic is required. This article will dwell on an alternative to the "receiver method" which might be called the "direct detection method." There are advantages and disadvantages to both techniques.

The advantages of the receiver method might be listed as follows:

1. Only a very weak signal source (microwatts) is required which can be supplied by transistors permitting independence of the power lines at the transmitting end.

2. Since low power is used, there is no need to sign the station call every ten minutes.

3. A greater range is usually possible.

On the other hand, the field strength method has the advantages of:

1. No power required at the receiving site where measurements are made, and no equipment other than a microammeter and matched detector.

2. Although fairly high transmitter power (watts rather than microwatts) is required, the transmitter power output is not as sensitive to line voltage changes as is receiver gain. This is because every stage in the receiver is gain-sensitive to supply voltage changes and the total effect is cumulative. For a transmitter usually only the final is appreciably affected by supply voltage changes since earlier stages are normally running class C.

Fig. 1 is the circuit and photograph of a 300-ohm balanced detector which can be connected to a microammeter for measurement of antenna gain. The SWR of this device is less than 2 to 1 at both 144 and 432 Mc. Fig. 2 is a calibration curve which will permit conversion of microammeter readings into db.

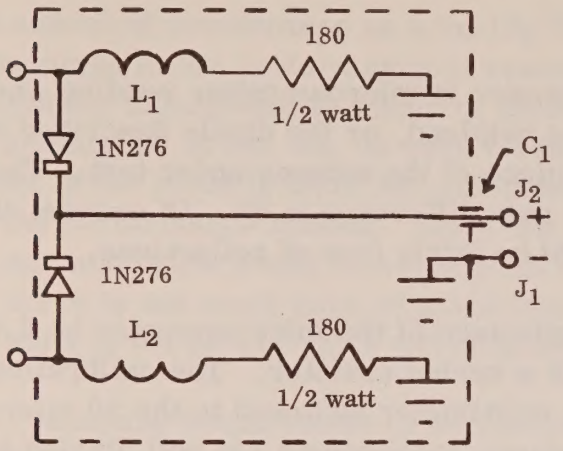
The purpose of the two 180-ohm resistors is to terminate the 300-ohm line. Inductances L_1 and L_2 tune out some of the capacitive reactance introduced by the diodes. Do not use larger wire for these inductances because the inductance will be less and the capacitance greater. The wire should be kept at least 3/8 inch from the walls of the can in all directions. Symmetry should be maintained as much as possible. The diode leads should be short, less than 1/4".

*Pine Cove, Idyllwild, Calif.

[1]Brown, F.W. "How to Measure Antenna Gain" CQ, Nov. 1962

[2]Brown, F.W. "The Antenna Measuring Contest" CQ, Oct. 1964

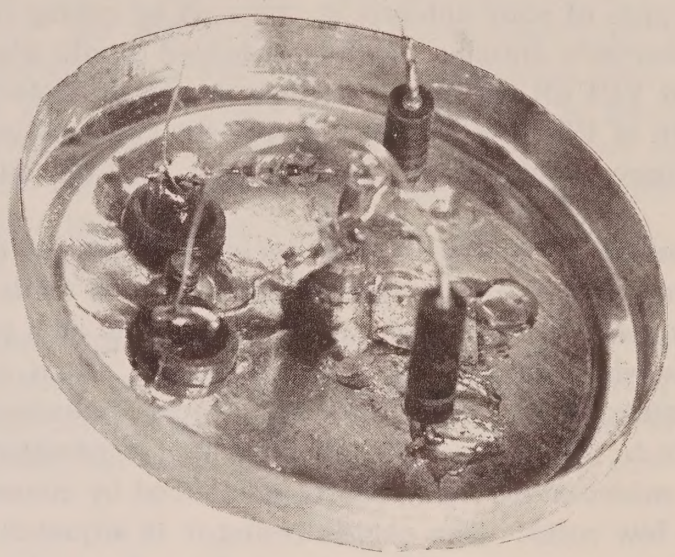
Fig. 1 Circuit and photograph of the 300-ohm balanced detector. It is built in a 1 7/8" diameter utility parts can. The input connector is a standard FT-243 crystal socket which will accept a Mosley type 301 twinlead plug.

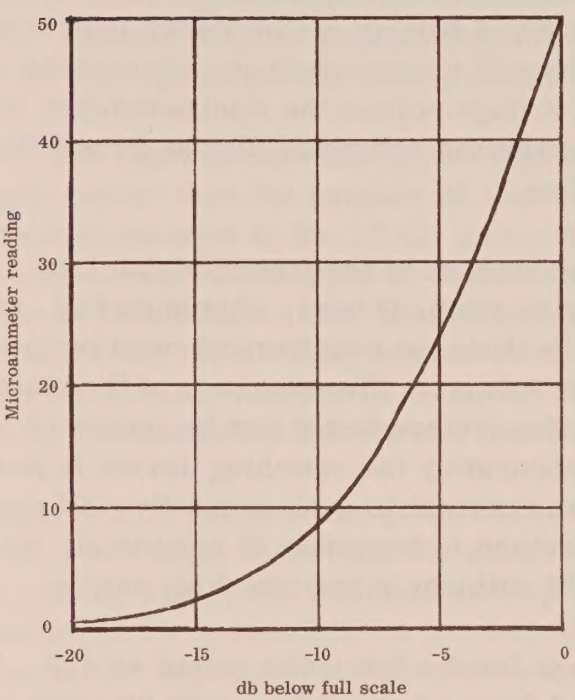


C_1 -- .001 mfd. feed-thru bypass

J_1, J_2 -- phone tip jacks for microammeter

L_1, L_2, -- 1 1/2 inches #28 tinned copper bent into U shape





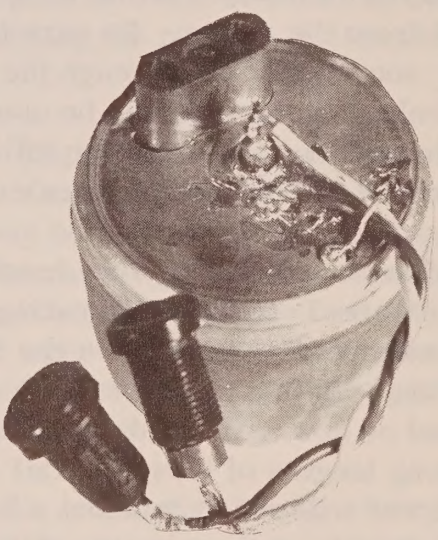
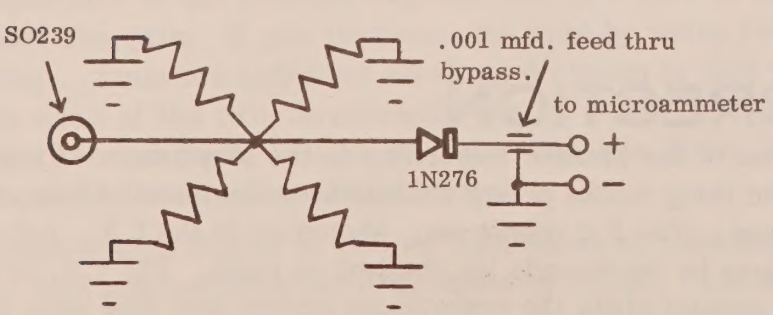


Fig. 2 - Calibration curve for the detector of Fig. 1 or Fig. 3 used in conjunction with a 5000 ohm 50 micro-amp meter.



All resistors 220 ohm, 2 watt composition

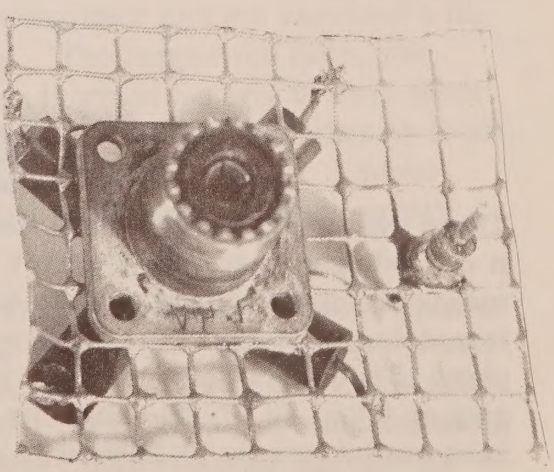


Fig. 3 Combination 50-ohm detector and wattmeter/dummy load for use with coax. Built on a 2" square of hardware cloth.

If you are standardized on coax, a detector of the type shown in Fig. 3 should be of interest. It was originally designed as a combination dummy load and wattmeter and is an excellent match to 50-ohm coax on all bands through 1296 Mc. Fig. 2 also applies to this detector using the same 5,000-ohm, 50 microampere meter.

The gain of your antenna is obtained by noting the difference in microammeter reading when a reference antenna (such as a folded dipole when using twinlead, or the dipole described in April VHFER for coax) is plugged into the detector in place of the antenna under test. The curve of Fig. 2 will then convert the two readings into gain difference in db. Of course, the distance requirement[1] must be met, and the site should be fairly free of reflections.

To make use of Fig. 2 it is necessary that the d.c. resistance of the microammeter be 5,000 ohms. If it is less, the difference can be made up with a series resistor. The calibration curve was made using a Japanese 20,000 ohm per volt multimeter switched to the 50 microamp scale which is also the 1/4 volt scale. The d.c. resistance is therefore 1/4 volt divided by 50 microamps, or 5,000 ohms. Most American-made 50-microamp. meters are about 2,000 ohms in which case a 3,000 ohm series resistor would be required. The d.c. resistance of any microammeter is easily measured by connecting it in series with a resistor and a battery of a few volts. The series resistor is adjusted in value until the meter reads full scale. Then a 10K pot connected as a rheostat (center and one end) is shunted across the meter and adjusted until the meter reads half scale. At that setting of the pot, the resistance between the terminals is equal to the resistance of the meter and is easily measured with an ohmmeter after it is disconnected from the meter. Be sure to use at least 3 volts of battery so the meter is driven from a current source(current through the series resistor doesn't change when you connect the pot.) Alternatively, a voltmeter can be used to measure the voltage across the microammeter when current through it is adjusted for full-scale deflection (with the voltmeter across it) and the resistance of the meter movement calculated by Ohm's Law.

Matched detectors are also very handy for matching the antenna to the transmission line. A match is obtained simply by adjusting the matching device (stub, Q bars, aluminum foil, etc.) for maximum received signal on the microammeter. No distance requirement need be met for matching. In fact, the operation can be carried out indoors. The accuracy of the match will depend on how well the detector is matched to the line (remember it can be improved with pads or long lengths of lossy coaxial line) and on how accurately the matching device is peaked. 1/2 db. error will result in about a 2 to 1 SWR so it is important to peak carefully. Of course, this method will not insure a low SWR if the matching device is incapable of completely matching the antenna, but it will give the lowest possible SWR with any given matching device.

For antenna measurement it will be necessary to have at least a few watts output on 432. With about 400 watts ERP (effective radiated power) obtained from a transmitter with 20 watts output into a 13 db. transmitting antenna, and using a 10 db. gain receiving antenna, we get about 25 microamps at 200 feet. This is more than enough distance for all but the very largest 432 antennas. End.

CORRECTION

There was an error (or two) in the diagram of the Marker Generator in the May issue. I regret it exceedingly, however WA6EWV says the thing works pretty well without the tunnel diode which means the circuit would work to 432 anyway. The 2.2 output cap. should go to the t.d., not the transistor collector. The T.D. symbol may be backwards but the text is right. The t.d. in the photo is not a T.D.-2. There is nothing special about the transistors except that they have good gain at 1 Mc. so if you substitute another PNP be sure its alpha cutoff is well above 1 Mc. We have used Amperex 2N3399s with no problem and a number of other types should work OK.

NOTES ON ANTENNA GAIN

By Bill Roberts, W9HOV
Gain, Inc.

The advent of moonbounce as a reality for the amateur has been brought about largely by improvements in the performance of receivers and antenna systems. The moonbounce path is completely unforgiving in terms of performance. The path is nearly half a million miles and the attenuation at 144 Mc. is very large and approximately constant. The reflection coefficient of the moon is know and unfortunately is not large. There are no shortcuts in obtaining the performance needed. Since the transmitted power is limited to one kilowatt, we cannot just add brute power to accomplish the feat. The best receivers are now quite sensitive and there is not much hope of great improvements in the future. Actually, below 300 Mc. the limit is set by sky noise which is largely of cosmic origin.

The remaining requirement is an adequate antenna which must have a minimum gain of about 20 db. over a dipole. The gain of an antenna usually is an unknown quantity taken on trust from the manufacturer whose selling point is the advertised gain of the antenna. Those with experience are able to form their own conclusions, but most of us have to rely on the published information.

There is a basic rule with antenna gain figures, namely that doubling the size of the antenna will produce a 3 db. increase in gain. The basic rule applies in almost every case. For instance, stacking two identical antennas will increase the gain by 3 db. or doubling the length of the antenna will accomplish about the same thing. Doubling the number of elements will not do this unless the antenna is lengthened accordingly.

The most common antenna is the Yagi and the gain of the Yagi is governed by the physical length rather than the number of elements used. That is a most important fact to remember. A typical example is the 12 db. gain over a dipole that may be obtained from ten elements on a boom of two wavelengths or about 13 1/2 feet on two meters. An antenna of twenty elements could be fashioned on this two-wavelength boom but its gain would not exceed the 12 d. b. obtainable from the 10 wide-spaced elements. This should explode the myth that gain comes from the greater number of elements alone. Bandwidth is made greater with the use of additional elements but the overall gain is limited by the boom.

Simply put, if one antenna gives 13 d. b. gain, it would take two to give 16 db., four to give 19 db., and eight to give 22 db. gain. Realizing that doubling the size of an antenna increases the gain by 3 db., we find the bulk rapidly reaching gigantic dimensions when the antenna is considered for a moonbounce project which necessitates gains exceeding 20 db. For instance, a two meter antenna would require a space at least 20 by 22 by 14 feet to give 21 db. gain, a very formidable piece of machinery.

The next bitter pill to be swallowed is the minimum stacking distance between beams. The aperture of the beam must be considered. Aperture is directly proportional to gain and this may be imagined as an infinite sheet of metal between the transmitter and the receiver with the aperture of the antenna represented by a hole in the sheet. The larger the hole, the greater the gain. If you increase the gain by using two holes, it would not pay to have them overlap. Thus the optimum stacking distance is that which just allows the apertures to touch. In the case of the two-wavelength Yagi it would be about 11 feet between booms. A moonbounce antenna made of nine of these Yagis in three lines of three would be 22 feet square measured between the outside booms.

The gain over a dipole is simply measured by substituting a half-wave dipole for the antenna under test and noticing the difference in signal. Incidentally, having the "other fellow" read the difference on his "S" meter is a poor testing device since the "S" meter calibration may not be what the receiver manufacturer says it is. A much better way is to rely on accurately calibrated attenuators. They avoid the error caused by receiver non-linearity but are not always readily available.

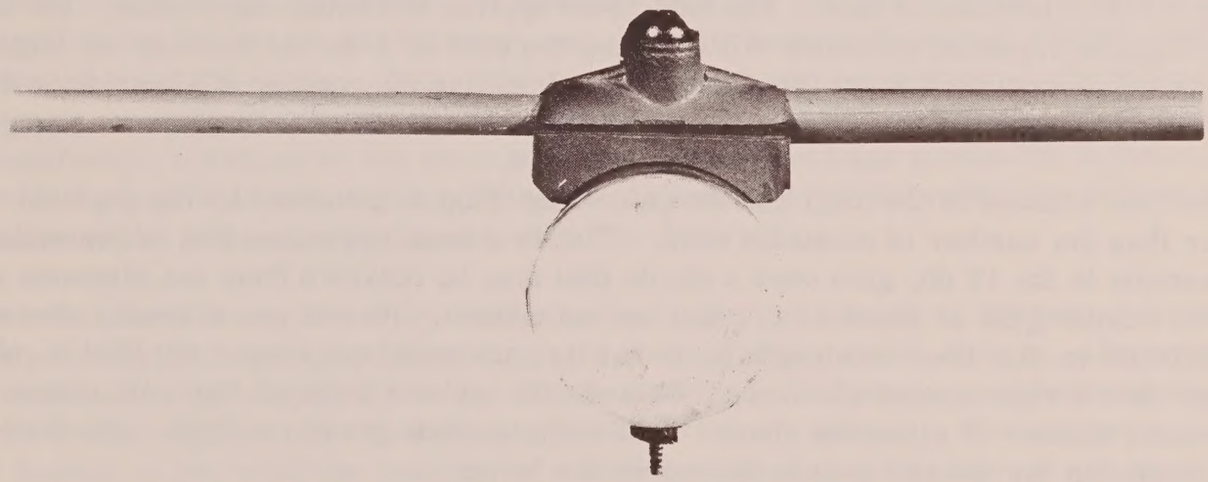
This all may sound simple, but when a number of tests are taken on an individual antenna the results may vary widely. The greatest error results from the fact that the antenna may not be receiving the direct signal alone, but reflected signals from the ground or other reflecting objects. You can see the effects of reflections if you walk around or near the antenna and watch the fluctuations in signal strength.

The amount of room required for an accurate testing range is quite large and tests taken on inadequate ranges often result in very conflicting results. In addition, the site should be as free from reflections as possible. A simple formula for determining the minimum range required is

$$R = \frac{4D^2}{\lambda}$$

where R is the minimum distance between transmitting and receiving antennas, D is the largest dimension of the antenna under test, and λ is the wavelength measured in the same units as R and D.

In conclusion we offer this advice: Be skeptical of gain figures that seem to be rather high. It could be that you are buying something that will not produce the expected results.



ANTENNA ELEMENT MOUNTS

IF YOU LIKE TO BUILD YOUR OWN ANTENNA, CONSIDER THESE MOUNTS WHICH WILL MAKE YOUR ANTENNAS MORE RUGGED, AND EASIER TO BUILD. AN ANTENNA MADE WITH THESE MOUNTS IS A WHALE OF A LOT EASIER TO TUNE BECAUSE YOU CAN CHANGE ELEMENT SPACING EASILY. OTHERWISE YOU HAVE TO DRILL BIG HOLES IN THE BOOM AND JUST GUESS WHERE THE ELEMENT WOULD WORK BEST. REMEMBER THAT ON A YAGI THERE IS AN OPTIMUM ELEMENT LENGTH AND ELEMENT SPACING FOR MAXIMUM GAIN AND A GIVEN ELEMENT AND BOOM MATERIAL. ADJUSTMENT NEAR THE DRIVEN ELEMENT IS VERY CRITICAL. WHEN YOU CAN MOVE THE ELEMENTS ALONG THE BOOM AND NOTE THE IMMEDIATE EFFECT ON GAIN, YOU CAN EASILY SEE WHEN YOU'RE GETTING SOMEWHERE.

ELEMENTS ARE DIE-CAST FROM ZAMAC AND ARE IRIDITE TREATED TO RESIST CORROSION. THEY ARE RUGGED. MY 6 METER BEAM CAME DOWN AND BROKE THE BOOM, BUT NOT THE ELEMENT MOUNTS. I'VE NEVER SEEN A BROKEN ONE YET. THE MOUNT IS IN TWO PARTS. THE UPPER PART HAS A MODIFIED V CONTOUR TO ACCOMMODATE ELEMENTS FROM 3-16 TO 3-8 INCH DIAMETER. THE BOTTOM PART FITS TV MAST, AVAILABLE EVERYWHERE IN 10 FOOT TELESCOPING SECTIONS. HOWEVER, IT WORKS VERY WELL WITH INCH AND A HALF BOOMS TOO. CHOICE OF HOLE SIZE FOR NO. 8 OR NO. 10 MACHINE SCREW. FOUR SETS (TO MOUNT FOUR ELEMENTS) FOR $1, POSTPAID. $ .25 FOR EACH ADDITIONAL SET. DEALER INQUIRIES INVITED ON MOUNTS ONLY.

PARKS ELECTRONICS LABORATORY
ROUTE 2, BOX 35 • BEAVERTON, OREGON

A TIN CAN CONVERTER FOR 432 MC

by Louis Hutton, K7YZZ*

432 is the up and coming VHF band in most areas of the country. In many of the larger cities there is 432 activity almost every evening. Band openings on 432 can extend for a thousand miles or more in some areas. There are also a number of 432 repeaters in operation on TV towers and mountain tops. The effect of orbiting and stationary satellites on 432 activities should be tremendous.

Unfortunately, many hams have had trouble building 432 gear. The sheet metal work required may not easily be done in the modest facilities of most ham shacks. Many converters described in ham magazines use high-priced tubes that are hard to tame and hard to handle mechanically. Many hams are still reluctant to use transistors. A project is always easier to get started and completed if all or most of the parts are at hand. The tin can converter was designed for easy, low-cost construction. It should be as easy to get to work as any 432 gear you might build.

The tin can converter as it is described is for local work. With r.f. amplification ahead of it the performance can be improved considerably. You can look at it as half of a high-quality converter, the other half of which can be built later as a separate unit.

The circuit diagram is shown on the front cover of this issue. Only two tubes are used. The 6J6 is a double triode that performs as oscillator and tripler. A 1N82A diode acts as a tripler also, working into the injection frequency coaxial cavity tuned to 404 Mc. The injection coupling to the crystal mixer is made by close-coupling the injection pickup link probe to the top of the crystal mixer link. The 432 Mc. received signal is also coupled into the mixer cavity and the difference frequency is taken from the right end of the crystal to the 6AG5 I.F. amplifier. The purpose of the I.F. amplifier is to assure you of a low-noise stage of amplification before you go into your receiver, as many receiver front ends are not what they should be at 28 Mc. A crystal mixer has a relatively low noise figure but so much signal is lost in the conversion process that you can't utilize its low noise figure unless you follow it with a very low noise I.F. stage or preceed it with a lot of R.F. gain, which may be hard to tame.

The complete converter is shown in Figs. 1 and 2. It uses tin cans as coaxial resonant circuits. In Fig. 1, the can with the BNC connector is the preselector, the center can is the mixer and the other one is the injection cavity. The entire converter is built on a flat piece of aluminum which is fastened into an inverted chassis. Construction is easier on a flat plate and when the plate is fastened to the chassis, the unit is mechanically strong and shielded besides.

CONSTRUCTIONAL DETAILS

The tin cans originally contained fruit juice and should be easily obtained. The center rod of the tin can tuned circuit is soldered to the bottom of the can from the outside. The grounded end of the pickup link is passed through a hole drilled next to the center rod in the bottom and soldered. Insulating sleeving is passed over the links when going from one can to the next to prevent shorts.

The 1N21 crystal mixer output bypass capacitor is formed by a small semicircle of sheet metal (tin can stock or brass) mounted over a sheet of plastic (bread wrapper) on the bottom of the mixer can. The attaching screws are insulated from the metal sheet by shoulder washers. This home-made bypass has extremely low series inductance and effectively grounds 432 and 404 Mc. energy but does not bypass much of the 28 Mc. I.F. energy. Details of the construction of this capacitor are shown in Fig. 3. An octal tube socket pin was used as a clip to connect to the tip of the mixer diode.

* 12235 S.E. 62nd St., Bellevue, Wash. 98004

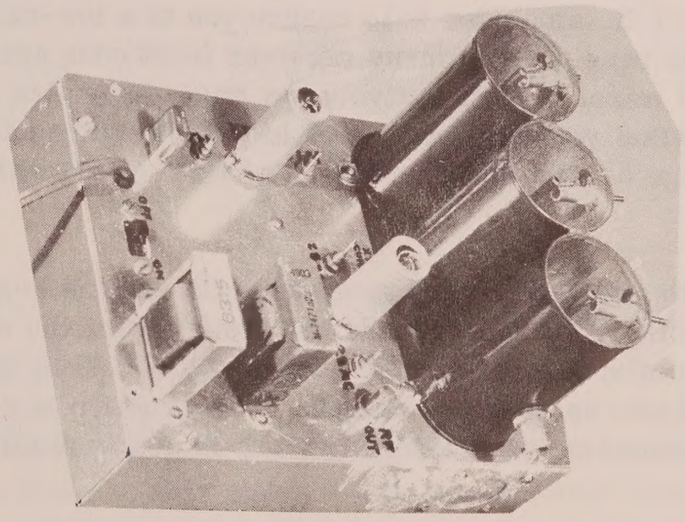
TUNE UP

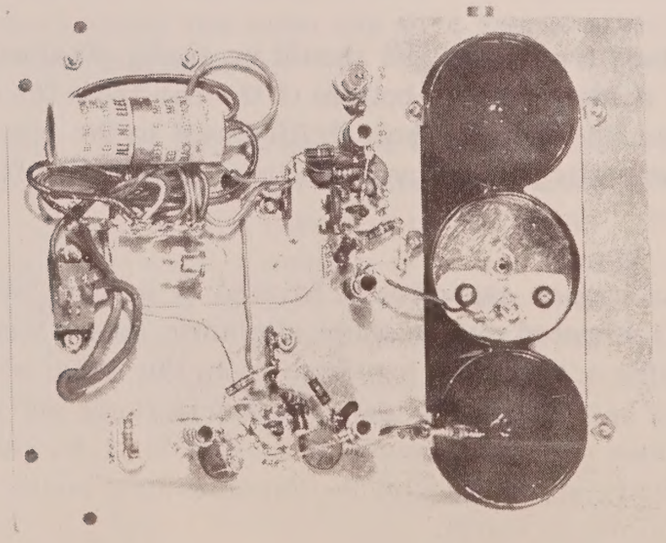
A grid-dipper is used to rough-tune the coils to the proper frequency. With the grid dipper in the "diode" mode of operation, the 6J6 oscillator and tripler are tuned for maximum detected output. There are two ways to tune the injection cavity. One way is to put a low-resistance 1 ma. meter in series with the 1N21 circuit to ground as shown in the diagram. The meter resistance should be not more than 100 ohms (don't measure it with an ohmmeter or you may ruin the meter.) The other way is to put a 100-ohm resistor in place of the meter and measure the voltage across the resistor. Crystal current should run between .2 and 1 ma., so the voltage should be between .02 and .1 volt. The resistor may be left in the circuit or shorted after proper adjustment has been made.

Next, connect the converter I.F. output to a receiver tuned to 28 Mc. and feed a 432 Mc. signal into the converter input. Tune C_1, C_2, L_1 and L_2 for maximum r.f. output as noted on the receiver's "S" meter. It is desirable for the noise output of the converter to cover up the noise of your receiver front end. Test for this by removing the 44.888 Mc. xtal & noting the drop in the noise. It should drop by a noticeable amount. If it doesn't, you have trouble--either in the converter or in your receiver. Reception of automobile ignition on a 432 converter is a favorable sign but does not mean as much as some people think. You will not hear an increase in background noise level when the antenna is connected. You must do the final tune up on an actual weak 432Mc. signal.

ADDING A PREAMPLIFIER

If you wish to add a preamplifier at a later time and want to approach the limit on weak signal reception, it will be necessary for you to use more than one stage of r.f. amplification. At least two stages of transistor amplification will be required. End.





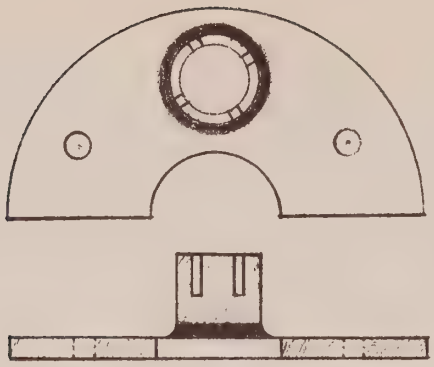


Fig. 3. Details on construction of the crystal mount. The black area around the base of the tubing represents a solder fillet. The drawing is not to scale.

Open Bands

By Marilyn Wiseman, K8ALO

Since this column is fairly new I imagine it will take time to catch on. I've received very little mail from readers and the few I did hear from are in the eastern states. In order to make the column more interesting I need reports fro m other parts of the country. I'm sure in time you would all be bored reading the same calls over and over again. If no reports are sent to me I surely can't report them. Reporting is really quite simple. All letters received will be acknowledged.

The following information is required: Call, date, time, city, state, freq. and approximate number of miles worked. it would be appreciated if you reported all times in 2400 hour time. Of course don't forget your own call so I'll know who worked who-Hi! The column is strictly for band openings at 50 Mc. and up so please don't send other types of info. for publication.

50 Mc:

May 10 W8PHJ (White Lake, Mich) worked K6VIH (Huntington Beach, Calif.) 2600 miles and KØSGX (Denver) Time 1010-1345
May 11 K1WYS/4 (Orlando, Fla.) heard K1ZGH (Scituate, Mass.)
May 12 K1WYS/4 heard K1MRI (Ridgefield, Conn), K1TZC (Whitman, Mass.)
May 18 K1WYS/4 heard W1KKB (N.H.)
May 23 WA8GBZ (Struthers, Ohio) wrkd WA6LJB, WA6SQT, K6MEF 2800 mi. 1245-1335
May 29 K1WYS/4 (Fla.) hrd W1JAE (Mass), W1KKB (N.H.), K2YWG (Hazlet, N.J.)
June 5 WA8GUP (Poland, Ohio) wrkd VP7DD (Bahama, Islands) at 1620, WA8BGZ (Ohio) worked K4RZB/4 (Athens, Ga.) at 0955.
June 18 WA8BGZ(Ohio) worked VP7NX (Bahama Islands) at 0910.

144 Mc:

May 2 K3GGZ (Enon Valley, Pa.) worked K8TCA (Horton, Mich), K8DBA (Monroe, Mich) 175 miles. Time 0810-0930
May 5 K3GGZ (Pa.) wrkd K2KGN (Bemus Point, N.Y.) 180 mi. at 2116.
May 9 W8PHJ (White Lake Mich.) worked WA9DOT (Grafton, Wisc.) 230 Mi. at 2040, K3GGZ (Pa.) worked WA8LBE (Detroit) 175 mi., VE3EXY (Blenheim, Ont.) 170 mi. 1003.
May 11 W8AXR (Calcutta, Ohio) hrd WØBRI (St. Louis) and WAØBMI (Des Moines.)
May 14 K3GGZ (Enon Valley, Pa.) worked W8QLO (Lavonia, Mich), K8YZK (Flatrock, Mich.)
May 16 K3GGZ (Pa.) worked K8PEJ (Troy, Mich.), W8QLO (Mich.), K8DBA (Mich.) all 175 m
May 19 K8ALO (Ohio) hrd W8AXN (Bangor, Mich.) 350 mi. at 2135, K3GGZ (Pa.) worked K2KGN (Bemus Point, N.Y.) 180 mi., WA8KBJ (Royal Oak, Mich.) 175 mi. 1850-2108
May 23 VE3EYX (Blenheim, Ont.) heard W4ZX (Fla.) on CW at 2000.

Please send ur DX reports to Marilyn Wiseman, K8ALO Box 103 Petersburg, Ohio

I mentioned last issue we were trying to correlate information and measurements on 432 receiving equipment with fellows on the east coast, namely W1FZJ and W1OOP. Pat, Sam's son, said our preamp. is in Puerto Rico where they have some pretty fancy test equipment and that it measured 4.75 d.b. Sam said it was better than any tube preamp he had ever measured. I asked if they were going to use it on the dish and the answer was probably not, they'll use the parametric amplifier. Henry Cross, W1OOP, has been running tests on the preamp. against his preamp. with a 2N3478. According to his measurements the 2N3478 (selected) runs a db. and a half or so better. The "or so" is for my poor memory. Hank believes in a tuned circuit at the input since he experiences TV interference without it . He uses a cavity ahead of his preamp. He lives very close to TV stations. We hope to get his 2N3478 preamp here to test using our equipment. If we also find it does a better job we'll switch provided there isn't too much trouble selecting 2N3478s. (we'd rather switch than fight) The 2N3399s are consistently good. With respect to the burnout problem with transistors, W7UDM used the preamp. in moonbounce tests on 432 with his KW at about 50% efficiency and a Dow Key relay with contacts that short the receiver input when transmitting. There was no transistor damage. No one has reported to us that they've burned out any transistors with r.f. I suspect part of the burnout problem is also the configuration that is used. We use grounded base in the preamp. and the new converter. The circuit for the preamp. was written up in VHFER (July, 64.) There are few if any copies here. For those of you who like to build your own, our experience has been that there was far less development time on that preamp. than on anything we've manufactured. No super-design on our part, the 2N3399s just work well.

Better get your home station in shape if you want to be in on things that may come off this fall or winter. See that you have a good 2 meter antenna you can control in azimuth and elevation and a high-powered rig to drive it. Circular polarization may help and the Gain Moonbouncer is probably a good antenna. You'd better also be sure you have a good 432 antenna and a low-noise receiver behind it. Have it so you are set to transmit on 144 and listen on 432. Oscar is part of it but by no means all of it. More later.

"IT CAN'T BE DONE"

By Bill Graham, VE4GI*

Last August after missing a contact with XE1OE I spent two weeks building and moved up to the 1200 watt range (ssb.) Since the band had closed down in the meantime, I began to think about ionospheric scatter. I worked WØHAN but I had done that before so I wrote to W1HDQ (I still need Conn. for WAS) to arrange for four scatter skeds on Saturday morning.

A local ham, who is considered by all to be my superior, told me that ionospheric scatter was impossible at amateur power levels so I wasn't surprised that I didn't hear a ping nor did Ed. Later a 250 mile tropo path proved impossible although I heard signals. So the big rig spent an idle winter. Recently I was persuaded to try again. My first sked on 50 Mc. was with WØPFP (600 miles)and it produced a contact with lots of signal to spare on ssb. I was very pleasantly surprised at this and arranged for two more skeds for the next Sunday. WØPFP was a little weaker, although there was plenty of signal. But K9HMB (750 miles) was about 80% readable and an easy contact. I'm looking for more scatter skeds on 6 and crying over a wasted winter. I have sworn that never again will I listen to a person who says "It can't be done."

*1743 Grant Ave., Winnipeg 9, Manitoba

VIDICON OPTICAL FOCUS & LIGHT LEVEL REQUIREMENTS

By Alfred Denson *

Two of the most frequent questions asked about the use of vidicon tubes in CCTV applications are the mechanical lens mounting requirements and the light level essential for proper operation. As normally constructed in the usual 1 inch vidicon of the general 6198 type and their equivalents, the arrangements of the photo-pickup tube (vidicon) in the camera is such that for all standard lenses, the image IN AIR would have to be formed at 0.690 inches behind the front surface of the camera front plate. The recess in the front plate mounting is normally made to accommodate a standard 16 mm C mount designed so that the FRONT of the C mount is flush with the camera front plate surface.

Any special lens mount should be designed so that when the lens is in position, the image in air will be formed 690 mils behind the front surface camera front plate.

The image plane of the vidicon is on the rear surface of the glass window, which is 87 mils thick (average.) When the vidicon is in place, the presence of the glass window moves the actual image plane back by approximately 29 mils due to the index of refraction of the glass. window. Operating image plane is 719 mils behind the camera front, on the average. The correct position of the vidicon is obtained by measuring 719 - 87 or 632 mils from the front surface of the camera C mount to the front surface of the vidicon's glass face. When the lens is at infinite focus, the optical image on the vidicon will be in focus with this arrangement.

The preceding shows why an 8 mm type of lens in a standard D mount has too short a focal plane to properly focus the image without moving the lens too close to the vidicon face, which, of course, gives a "looking thru a stove-pipe" effect. It also is sometimes useful where fast speed lenses of longer than normal focal length are required that it becomes desirable to use conventional 35 mm camera lenses with an adapter in place of the 16 mm movie camera types. For example, a 400 mm focal length lens of the 35 mm camera type would be available at a reasonable cost for use with an adapter to the usual 16 mm C mount whereas the same focal length in the 16 mm size would be prohibitive in cost, slower in speed and next to impossible to obtain.

The required light level for the vidicon is normally 0.3 to 0.6 lumens square feet of illumination on the cathode for a noise free picture. A useful formula for computation of this quantity is:

$$I_K = I_S / 8\ (f/-)^2$$

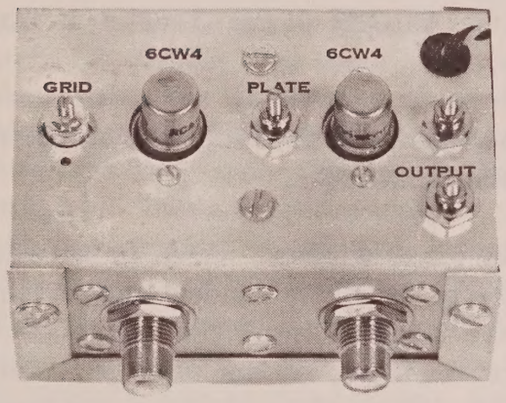
Example: $I_S = 320$, $(f/-) = f/4.5$, $I_K = 320/\ 8 \times (4.5)^2 = 2$ ft. candles

Where I_S is the measured scene brightness in ft. candles and $(f/-)^2$ is the square of the f/ number of the lens. I_K is in this case more than ample and the target of the vidicon could be operated at a lower than normal value. When the light level is low, the target needs to be advanced. Some high output vidicons will give a picture at 10 times lower light levels; i.e. at 0.03 to 0.06 ft. candles on the cathode.

Usually, however, electric focus may be found to be not quite as good in the higher output tubes, as with the human eye which accommodates itself to low light levels at the expense of resolution. In general, a rough rule of thumb would be that after the initial camera setup has been made, if you open the iris to the point at which the image (FLARES) then stop your lens iris down by one F stop and then readjust your beam target and focus controls, the best image for that particular set of conditions will be obtained.

*Longview Street, Rockville, Conn.

2 METER NUVISTOR CASCODE PREAMPLIFIER



$17.50 POSTPAID

NOISE FIGURE: 3 DB. GAIN: 20 DB.

FIXED STATION:

The amount of improvement you get in reception depends on how poor your present receiving set-up is and how much outside noise you have. Almost all converters will be improved somewhat, but not all will be improved significantly. No other pre-amplifier (except a parametric) will give a noticeably better signal-to-noise ratio than this one. Most improvement in performance will be noticed when this preamplifier is used ahead of military receivers, transceivers such as the Heath Two'er, Gonset Communicator, Poly-Comm., etc. The RME VHF-152 will be helped by this preamplifier as will other communications receivers and converters using non-nuvistor tubes.

MOBILE:

Many FM mobile receivers have an input sensitivity of 1 microvolt for 20 db. of quieting. This preamplifier used ahead of such a receiver brings the sensitivity to .2 microvolt for 20 d.b. quieting. This is equivalent to increasing the other fellow's transmitting power by 14 db. or approximately 25 times. It really makes a difference. It also permits the performance of the receiver to deteriorate considerably without noticeable effect because the low noise and high gain of this preamplifier compensates for deterioration in the rest of the receiver. The nuvistor maintains low noise figure much, much longer than other premium or standard tubes. This preamplifier fits in the Motorola 5V, 30D and most other FM mobile receivers. Special bracket and instructions for the Motorola 5V available at $1 extra.

POWER REQUIRED:

6.3 v. at 260 ma. or 12.6 v. at 130 ma. (easily changed internally.) 150 volts d.c. minimum at 15 ma. Higher voltage may be used with additional series dropping resistor.

CONNECTORS:

Phono (recommended for most mobiles and transceivers), UHF (SO-239), or BNC.

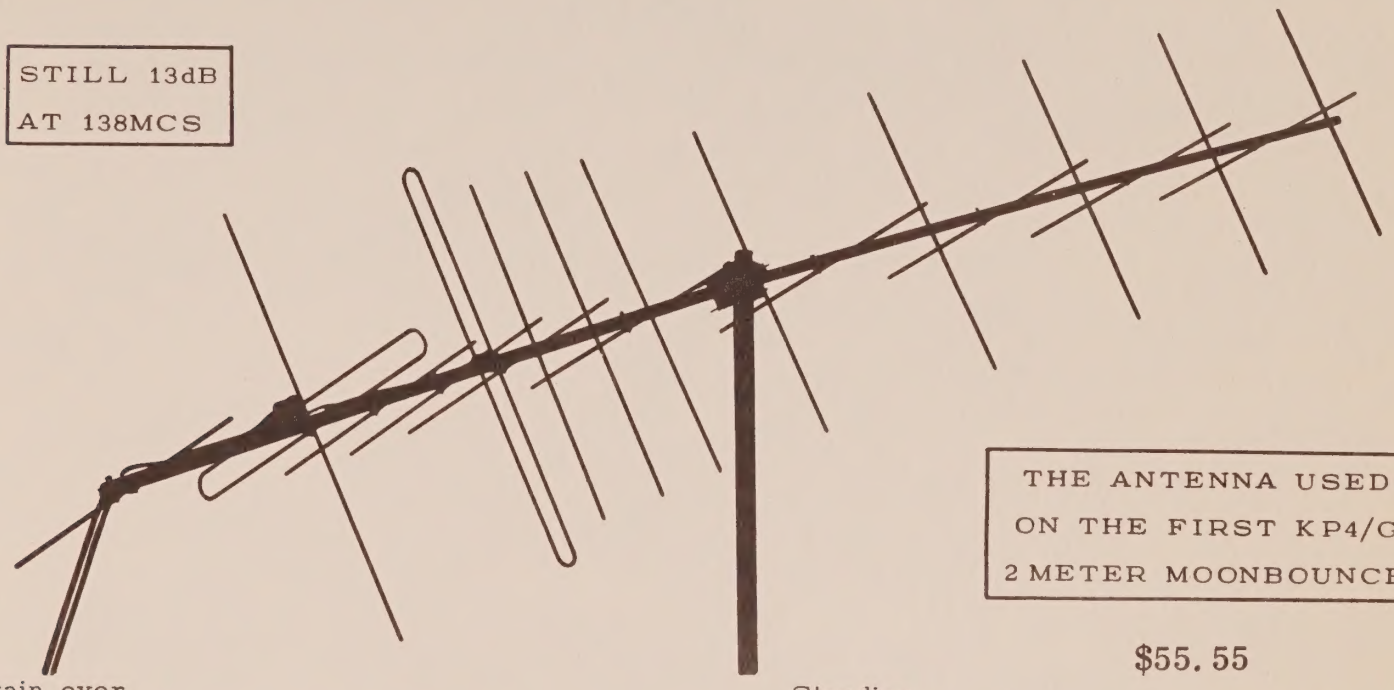
PARKS ELECTRONICS LAB.
ROUTE 2 BOX 35 BEAVERTON, OREGON

THE J BEAM

MOONBOUNCER

SATELLITE TRACKING ANTENNA

STILL 13dB
AT 138MCS

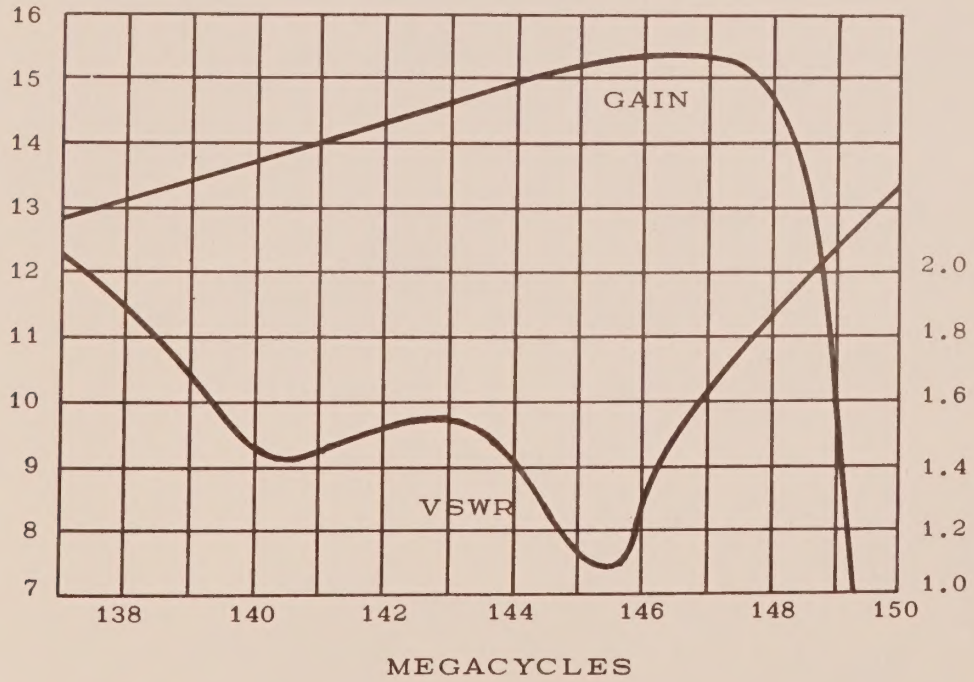


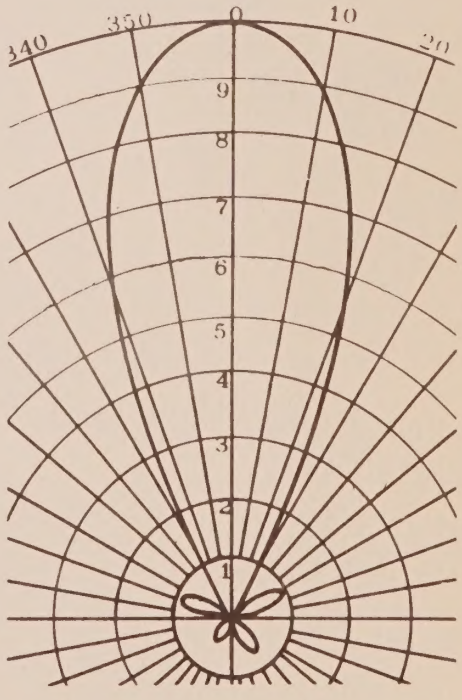
THE ANTENNA USED
ON THE FIRST KP4/G
2 METER MOONBOUNCE

$55.55

dB gain over
sotropic

Standing
wave ratio





Gain over isotropic.....	15.4dB	Turning Radius.....	104"
Front/back ratio	30dB	Net Weight.....	13.9lbs
½Power beamwidth	33°	Stacking distance above or alongside...	132"
Boom length.....	194"	Wind area.....	3.4sq.ft.
Width.....	41"	Wind load at 100mph.....	83 lbs.

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METEOR SCATTER SKEDS WANTED

Want meteor scatter skeds, primarily in Texas, Okla., Oregon, Idaho and Wyoming. 144 Mc. July & August preferred. Write Skip Freely, K6HMS 187 E. 22nd St. Costa Mesa, Calif.

Want meteor and tropo scatter skeds on 2 meters. Bill Smith, KØCER 1301 Churchill Ave., Sioux Falls, South Dakota 57103.

Want meteor scatter skeds on 144 Mc. with Louisian, Arkansas, Texas, Oklahoma, Kansas, Nebraska and No. Dakota, both for major and minor showers. Don Learned, W1AZK, Bear Hill Road, North Chichester, N.H.

Others always looking for meteor skeds, WØEYE, Box 563, Boulder, Colo. , W6DNG, 4608 La Cara, Long Beach 15, Calif. WA6QQI, 925 Redwood Ave. Sunnyvale, Calif.

50 Mc. Want skeds with KH6 land. 50 Mc. SSB or CW. Have 600 W. & 6 el. Telrex at 40 ft. W5SFW, Rt. 3 Box 219A, Amarillo, Texas 79107

If you have the power and the antenna to do the job, send a listing of your equipment and your desires for contacts and we'll try to find someone to oblige you. K7AAD

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